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ABSTRACT

This cross-sectional study examined the u-shaped development in graphic symbolization, a theory postulating that aesthetic properties of preschool children's drawings are similar to those of adult artists' drawings. Subjects were 140 artists and non-artists from 7 age groups, ranging from 5-year-old children to adults. All subjects were given the same 3 drawing tasks (draw: happy, sad, and angry), and the resultant 420 drawings were scored across 5 aesthetic dimensions. Analysis showed that across the dimensions of expression, balance, and use of line and composition, adult artist scores were significantly different from those of all other groups except for artist adolescents and 5-year-old children. In the use of symbolic vehicle and metonymic or metaphoric referent, artists performed differently from artist adolescents and 5-year-olds. Results support a view of the u-shaped development in which young children and artist adolescents occupy the two peaks of the u, with adult artists performing ahead of both these groups. Also, a progression was found in the construction of the referential connection underlying visual metaphor. Eleven drawings are included. (MM)

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Drawing's Demise: U-Shaped Development in Graphic Symbolization

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ABSTRACT

The hypothesis of u shaped development in graphic symbolization postulates that aesthetic properties of pre-school children's drawings are similar to those of the drawings of adult artists. Further, it contends that the early facility that accounts for this similarity is lost or submerged in middle childhood (often designated as the "literal stage") only to be recaptured later in life by artistically persistent individuals. In this cross-sectional study, this hypothesis was tested and confirmed.

One hundred and forty subjects formed 7 age groups including 5, 8, and 11 year old children; 14 year old artist and non-artist adolescents; and adult artist and non-artists. All subjects were given the same 3 drawing tasks: "draw: happy; sad; and angry." The resultant 420 drawings were scored reliably across the following aesthetic dimensions: 1) choice of symbolic vehicle (representational or non-representational); 2) overall expression (as possession and as either metonymic or metaphoric reference between symbol and referent); 3) overall balance; 4 & 5) appropriate use of line and appropriate use of composition, both as agents to expression of specific meanings. Expectations were for the youngest children (5 year olds) to score most and the literal stage children (8 & 11 year olds) to score least like the adult artists on all dimensions.

Across the dimensions of expression, balance, and use of line and composition, the adult artist scores were significantly different from those of all other groups except for the artist adolescents and 5 year old children ($p<.05$ Scheffe method). Contrary to expectation, in the use of symbolic vehicle and metonymic or metaphoric referent, artists performed differently from these two groups.

A view of the u emerged in which young children and artist adolescents occupy the two peaks of the u, with adult artists performing ahead of both these groups. Additionally, a progression was uncovered in the construction of the referential connection underlying visual metaphor. This development is discussed as a process of distancing between symbol and self in which use of the graphic symbol progresses from extension to invention.

Comparisons between the expressive and aesthetically pleasing drawings of pre-school children and the work of professional artists have been made by artists, philosophers, art educators, and researchers into early symbolic development (Arnheim, 1969; Gardner, 1973; Read, 1945; Schaefer-Simmern, 1948; Winner, 1982). The recognition of tangible similarities has provided an illuminating perspective on the development of an early facility in graphic symbolization (Davis, 1991; 1993; Davis & Gardner, 1993; Gardner, 1973).

A concurrent phenomenon has been observed: the young child's early prowess in graphic symbolization seems to decline with the onset of school, submerging or disappearing by middle childhood (ages 8–11). Apparently because of the increase in an inhibiting mandate for "photographic likeness," children in middle childhood are thought to be grounded in a "literal stage" in which the free expressions of "pre-literal" days are replaced by failed attempts at replicating physical reality or formulaic reproduction of stereo-types thereof (Gardner, 1980, 1982; Ives, Silverman, Kelly, & Gardner, 1981; Rosenblatt & Winner, 1988; Winner & Gardner, 1981). At this stage, most individuals give up entirely on their early artistic explorations. Except for artists , whose artistry is often declared by adolescence (Winner, 1980), it has been suspected that there is little if any development in skills of graphic symbolization beyond the literal stage.

U-shaped Development

This course of development from display of early facility, to disenfranchisement in middle childhood, to mature realization only by an artistic minority, has been described as u-shaped (Davis, 1991; 1993; Davis & Gardner, 1993; Gardner & Winner, 1982). In this configuration, the highly expressive drawings of the youngest children and the adult artists are envisioned at the two high peaks of the u, with the conventionalized drawings of children in middle

childhood bottoming out on the floor of the u. Indeed, it has been suggested that the cessation of development in drawing in middle childhood extends the floor of the u off to the right, transforming the configuration into an "L"—perhaps "L" for literal (Davis & Gardner, 1992).

The Current Study

Comparisons between child and adult art are usually made haphazardly. Champions of children's art will compare any 5 year old's drawing with, for example, any drawing by Miro or by Klee. In this study, ideational thematic constraints for the comparison were established by presenting the same drawing tasks to children at different ages, to a non-artist population, and to adult artists. Subjects were asked to "draw happy," "draw angry," and "draw sad;" and the resultant drawings were compared across a number of aesthetic dimensions (Davis, 1991).

Using the developed end state of the artist's work as a tool with which to measure the developing expressive efforts of children, this study focuses on the specific attributes that unite and separate the drawings of children and the drawings of artists. The research is guided by an hypothesis of u-shaped development: the course of development of the early facility is charted with consideration of what if anything is lost, and if lost, when.

In order to facilitate this inquiry, it was necessary to define and operationalize a scale of criteria for assessing aesthetic dimensions across which the drawings of different populations could be informatively compared. The literature was reviewed with this end in view (Davis, 1989). The resultant scheme is based in large measure on early research done at Harvard's Project Zero (e.g., Carothers & Gardner, 1979; Gardner, 1973, 1979, 1980; 1982; Gardner & Winner, 1982; Rosenblatt & Winner, 1988; Winner, 1982; Winner & Gardner, 1981; Winner, Blank, Massey, & Gardner, 1983; Wolf, 1987) which itself draws on

the work of Rudolf Arnheim (1966, 1969, 1974) and Nelson Goodman (1976, 1978), and on my own preliminary research (Davis, 1986; 1989).

Aesthetic Dimensions

The three aesthetic dimensions derived from the literature and operationalized are: 1) Symbolic vehicle; 2) Composition; and 3) Expression (i. Expression as Possession; and ii. Expression as Reference, including the referential distinction between *metonymic* and *metaphoric* connection).

Symbolic Vehicle

The symbolic vehicle is here defined as the precise graphic symbol used to represent and/or to express the symbolized referent or meaning of the drawing. In this study, the symbolic vehicle was first considered as either representational (a clear-cut depiction of a physical object) or non-representational (not recognizable as depiction; abstract configuration of form).

In other earlier studies, subjects were specifically instructed to use either representational or non-representational vehicles: for example, to draw a happy tree or a sad line (Arnheim, 1969; Edwards, 1986; Ives, 1984). By leaving the elicitations as amorphous as "draw happy," a strategy that proved successful in pilot study (1986), it was left to the subject to decide *what* the precise graphic symbol or symbolic vehicle would be and *whether* it would be representational or non-representational.

The choice of representational vehicles. Accordingly, the choice (conscious or not) of a representational vs. a non-representational vehicle, was considered as a possible developmental marker. Further, when the subject used a representational vehicle, what it was, and whether it was a cultural stereotype—for example, the rainbow as a stereotypical representation of happy—were noted.

The choice of non-representational vehicles. Certain artists (Marini in Jung 1964) and researchers (Golomb, 1992; Pariser, 1979) have suggested that abstract

symbols may be used more frequently than representational ones to represent negatively charged themes. In this study, it was noted whether and by whom non-representational vehicles were used more often to represent the negatively valenced emotions of angry and sad than the positively valenced emotion of happy.

Composition

Composition is defined here as the structure of the drawing, the visual ordering of form.: the placement of the symbolic vehicle (e.g., a rainbow) within the framed space of a piece of paper (as defined by its outer edges).

Overall balance. Using the definition of a balanced composition as the cohesive arrangement of form into a unified and consequently articulate visual statement (Arnheim, 1966, 1974), the extent to which each drawing was *balanced overall* either symmetrically or asymmetrically was considered. In symmetrical balance, shapes of equal size are perceived as balanced equally from side to side or top to bottom. Asymmetrical balance involves the balanced positioning of unequal shapes: for example, a large dense shape in a lower right quadrant of the page balanced by a smaller shape in the higher left quadrant.

Symmetrical vs. asymmetrical balance. Assuming that asymmetry is harder to achieve, previous studies (Golomb, 1992; Winner & Gardner, 1981) have considered at what ages children are able to construct asymmetrical compositions. However, it has been asserted that asymmetry is as common an occurrence of balance as symmetry—both in nature and in art (Arnheim, 1974); and its presence in drawings of subjects at all ages has been demonstrated (Winner & Gardner, 1981). The appearance of asymmetrical balance was therefore not considered as an outcome variable in this study.

Composition used as agent of expression. Rather then "when" asymmetrical balance, the question of "why" was asked: whether composition was used

appropriately as agent to the expression of the specific emotions. For example, asymmetrical balance might be used more appropriately as agent to expression of less centered feelings like sad (see drawing 1), while symmetrical balance might be used to express more centered feelings (see drawing 2) like happy.

DRAWING 1: a drawing of sad by a professional artist demonstrating appropriate use of composition (here, asymmetrical balance) as agent to expression of the emotion.

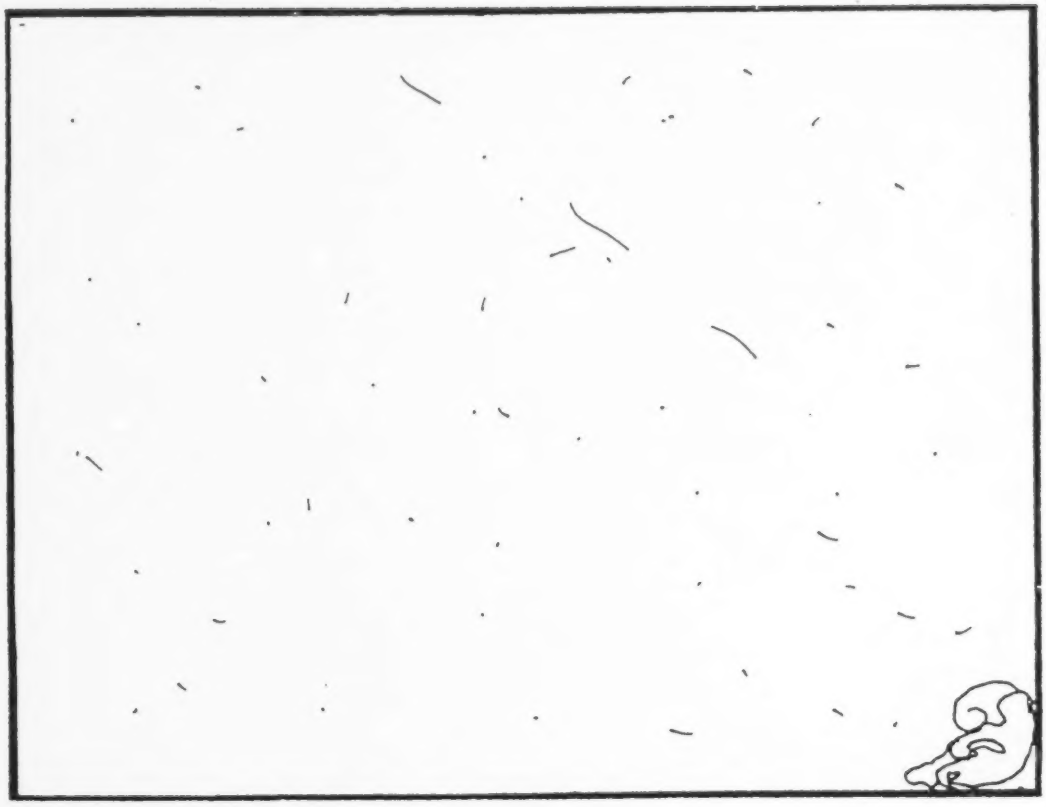
DRAWING 2: a drawing of happy by a five year old child demonstrating appropriate use of composition (here, symmetrical balance) as agent to expression of the emotion.

Expression

The two-part discussion of expression derives from Nelson Goodman's definition of expression as metaphoric exemplification, a quality comprised of possession (embodiment *of* emotion) *plus* reference (referral *to* emotion) (1976, p.53).

Expression as possession. A drawing is considered relatively expressive—in terms of possession—in so far as it *embodies* emotion through the use of line and/or composition. In a highly expressive drawing, the expression of emotion can be detected even from a distance at which the subject or precise symbolic vehicle of the drawing cannot be determined. The width and direction of line and/or the symmetrical or asymmetrical balance (as above) of the composition that construct the drawing determine whether the drawing IS, for example, a happy drawing (Maquet, 1986). This expression of emotion is metaphoric of course; a drawing cannot literally BE happy.

Line used as agent of Expression. Appropriate use of line as agent to possession of expression may include, for example, the use of drooping fine lines to express sadness; or jagged harsh lines to express anger (Arnheim, 1966; Lundholm, 1921; Werner & Kaplan, 1963).



DRAWING 1: a drawing of sad by a professional artist demonstrating appropriate use of composition (here, asymmetrical balance) as agent to expression of the emotion.

DRAWING 2: a drawing of happy by a five year old child demonstrating appropriate use of composition (here, symmetrical balance) as agent to expression of the emotion.

Expression as reference. Beyond *possession* by lines and composition, the symbolic vehicle of a drawing also *refers* to the emotion which the drawing is expressing. In this reference, there is a kind of connection between the symbolic vehicle (the image) and the symbolic referent (the emotion). Borrowing from the taxonomy of metaphor in language, two broad groupings for that connection—the referential component of expression—are posited: 1) *metonymic* and 2) *metaphoric.*

Metonymic vs. metaphoric referential connection: In metonymy, the connection accesses an extension of meaning from referent to symbol which may clarify meaning. In metaphor, the connection accesses an interaction between symbol and referent which results in the construction of new meaning. Where metaphor relies on *found* similarity between topic and vehicle, metonymy relies on *known* associations (Leach, 1976; Winner, 1988).

Metonymic Connections. Under these two broader groupings, 4 different referential connections are posited (see table one below).

TABLE 1 **LEVELS OF REFERENTIAL CONNECTION**

METONYMIC CONNECTIONS
Metonymy 1: Metonymic/Physiological Connection
Physiological occurrence of emotion: person or animal is displaying emotion. *Person*
Metonymy 2: Metonymic/Narrative Connection
Person is incorporated into a scene in which emotion occurs. *Person in Scene*
METAPHORIC CONNECTIONS
Metaphor 3: Metaphoric/Objective Connection
Person is removed from scene. Object or scene in or through which emotion occurs and/or which elicits emotion from subject. *Object or scene; no person*
Metaphor 4: Metaphoric/Non-Objective Connection
Person, Object, scene removed. Visual elements conspire to present emotion directly. *No object, scene, or person*

Although the expressive embodiment of emotion can occur with any of the referential connections, an overall progression in the ability to construct these connections was posited, from Metonymy 1 to Metaphor 4. This supposition was based on related research (Gardner, 1980; Lowenfeld, 1964; Mendelowitz, 1963; Smith, 1983; Wilson, 1974; Winner, 1982).

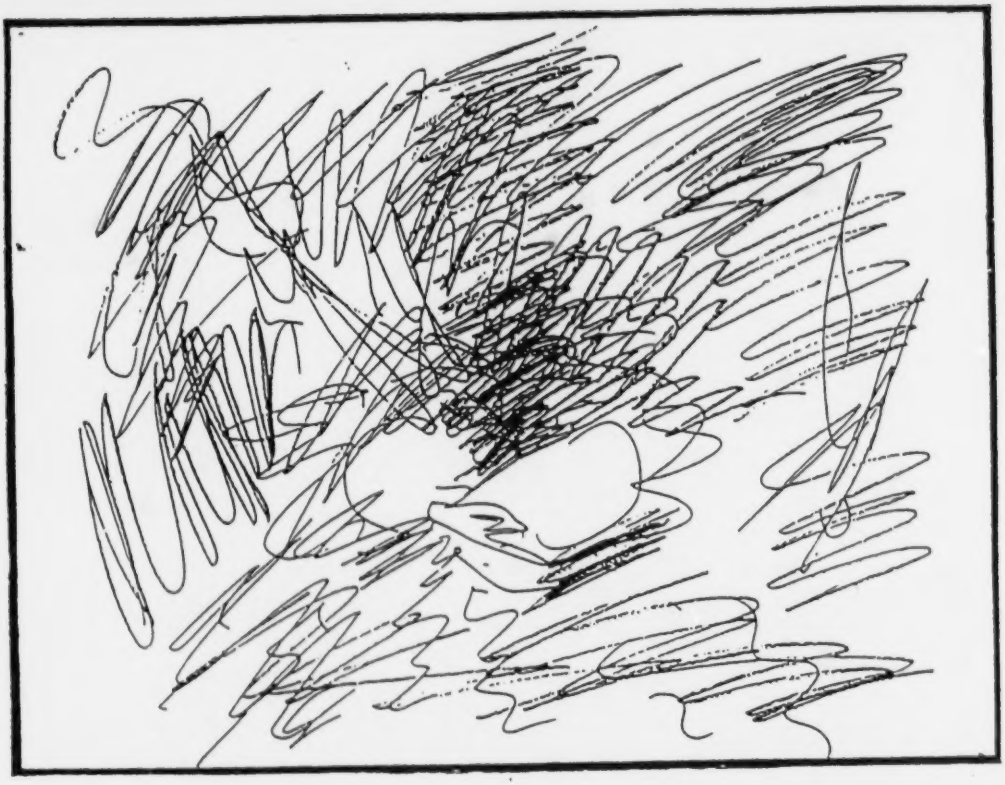
The first connection is Metonymy 1: metonymic/ physiological. A drawing of a happy person physiologically displaying the emotion of happy (as in drawing 2) would be classified as Metonymy 1 (Lakoff & Kovecses, 1987). If the happy person is incorporated into a narrative; for example, in the drawing of a person who is happy because—and the interaction is displayed—a friend is giving her an ice cream cone, the connection is noted as Metonymy 2: metonymic/narrative. In both examples, metonymy *extends* meaning to familiar associations. We expect emotions to be found in human beings either displayed on their own or in or as a result of interaction.

Metaphoric connections. When a person or animal displayed as agent to the expression of the specific targeted emotion is absent from the scene, and the drawing is representational (a clear-cut object is shown), it is classified in this scheme as Metaphor 3: the metaphoric/objective referential connection. A drawing of happy in which just the ice cream cone is depicted (with neither giver nor receiver portrayed) would be an example of the metaphoric/ objective referential connection. New meaning is created through the juxtaposition of an object (the ice cream cone) which is not in itself literally displaying the targeted emotion (the cone is not happy) and the emotion at hand. The symbol of the ice cream cone may be perceived as a "token" of the undisplayed scene.

In Metaphor 4: the metaphoric/non-objective connection, there is no representational object displayed. See, for example, the drawing of angry by a professional artist (drawing 3 or another drawing of angry by a 5 year old child (drawing 4):

DRAWING 3: Angry by a professional artist employing Metaphor 4: the metaphoric non-objective connection.

DRAWING 4: Angry by a five year old child employing Metaphor 4: the metaphoric non-objective connection.



DRAWING 3: Angry by a professional artist employing Metaphor 4: the metaphoric non-objective connection.

DRAWING 4: Angry by a five year old child employing Metaphor 4: the metaphoric non-objective connection.

In both drawings, the metaphoric connection is made between the non-representational image of dark endless scribbles and the emotion of anger. The perceiver needs to make sense of the image by reconstructing it, i.e., by discovering the similarities and consequent association which has been introduced between the non-representational image of dark endless coils of line and the emotion of anger.

Relation of Reference to Possession. Occurring in conjunction with appropriate use of line and/or composition, a drawing in which *any connection* is used may be thought of as expressive. However, with Metonymy 1 and 2, the appropriate use of line and/or composition as agents of possession of expression is not *essential* for the correct deciphering of a drawing's meaning or the emotion it represents. Through decoding a smile face or the scene of the gift of the ice cream cone—even depicted with stiff stick figures—the drawing can be correctly "read" as happy. However, if the drawing of just the ice cream cone (Metaphor 3) were done in dark angular lines, its meaning might be misunderstood. Metaphor 3 *may* rely on expression as possession to achieve accurate perception of the intended emotion. In the metaphoric/ non-objective connection (Metaphor 4), however, the successful conveyance of intended emotion relies *entirely* upon embodiment by or possession of the aesthetic dimensions of line and composition. If not for attention to line quality and composition, a perceiver would not know that drawings 3 or 4 were drawings of angry; the symbolic vehicles cannot otherwise be "decoded."

Hypotheses

Across all dimensions, expectations were for the youngest children to perform most like the adolescent and adult artists in strategies of graphic symbolization (in similar choice of either representational or non-representational symbolic vehicles and metonymic or metaphoric referential

connections) and in relative achievement (in producing the highest number of most expressive and well balanced drawings overall with the highest level of appropriate use of line and composition).

Expectations for the literal stage children were to perform most like the adolescent and adult non-artists (in similar choice of predominantly representational symbolic vehicles and metonymic referential connections, and in producing the lowest number of highly expressive and well balanced drawings overall, displaying less appropriate use of line and composition). It was expected that non-artist adolescents and adults would perform like the children at the literal stage. A summary of the hypotheses and their reflection of u-shaped (and l-shaped) development is presented in figure 1.

FIGURE 1

Methodology

Subjects

One hundred and forty randomly selected subjects comprised 7 groups (approximately 10 males and 10 females in each group) as follows:

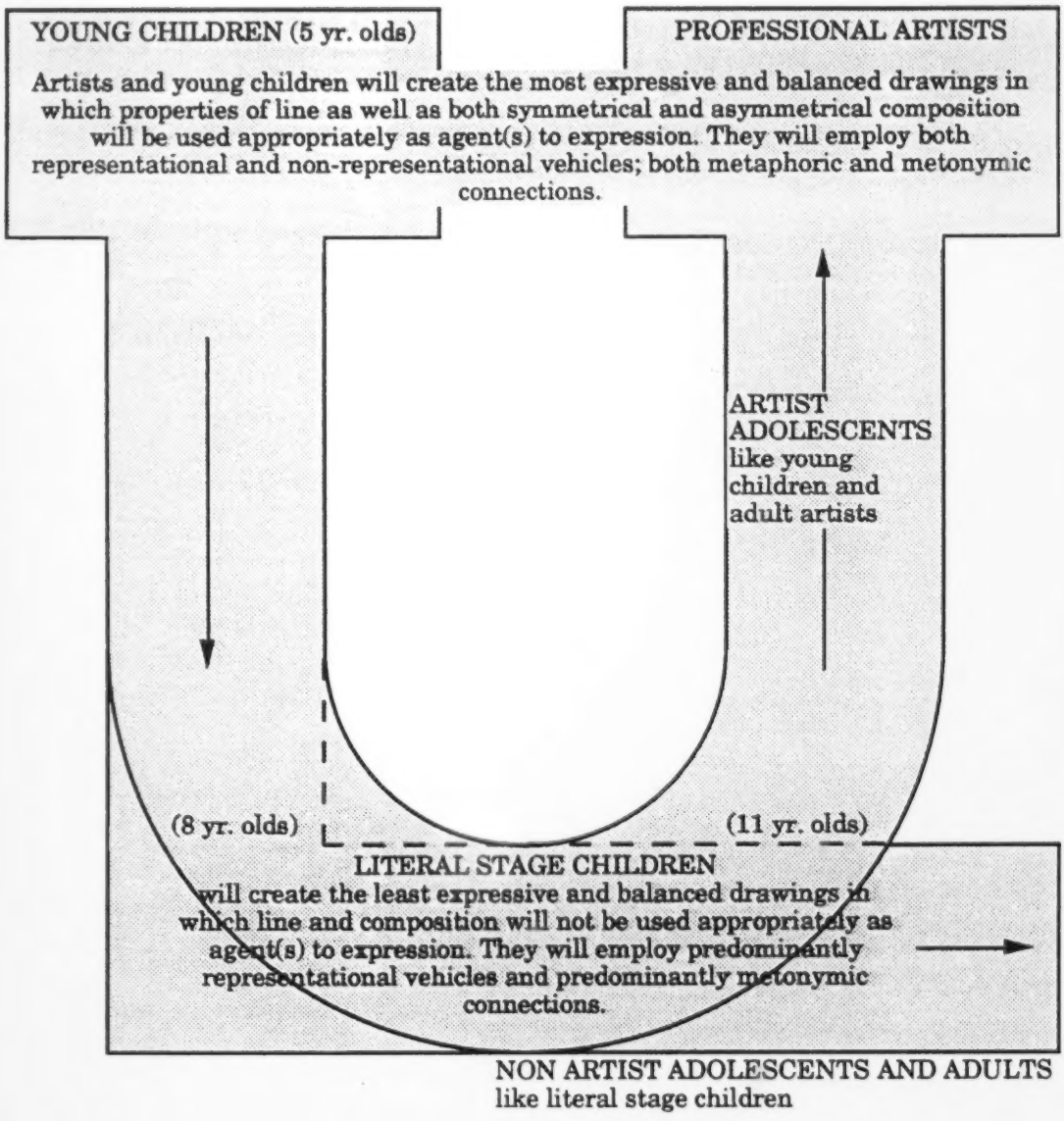
TABLE 2: SUBJECTS' AGE GROUPS

GROUP (n=20)	MEAN AGE (in yrs. and % of yr)	RANGE	STANDARD DEVIATION
1:(youngest children):	5.35	4.75–5.83	.28
2:(literal stage):	8.21	7.33–9.33	.63
3:(literal stage):	11.23	10.41–11.83	.39
4: (non-artist adoles):	14.11	13.66–14.83	.31
5: (artist adoles):	14.26	13.16–15.08	.52
6: (non-artist adults):	41.60	22–78	15.47
7: (artist adults):	41.95	18–63	12.96

All subjects were from the greater Boston area. Written permission for participation was obtained.

FIGURE 1

SYNOPSIS OF HYPOTHESES AS THEY REFLECT U-SHAPED BEHAVIOR


YOUNG CHILDREN (5 yr. olds)
PROFESSIONAL ARTISTS
Artists and young children will create the most expressive and balanced drawings in which properties of line as well as both symmetrical and asymmetrical composition will be used appropriately as agent(s) to expression. They will employ both representational and non-representational vehicles; both metaphoric and metonymic connections.
ARTIST ADOLESCENTS like young children and adult artists
(8 yr. olds)
(11 yr. olds)
LITERAL STAGE CHILDREN
will create the least expressive and balanced drawings in which line and composition will not be used appropriately as agent(s) to expression. They will employ predominantly representational vehicles and predominantly metonymic connections.
NON ARTIST ADOLESCENTS AND ADULTS
like literal stage children

Materials

Drawings were done on 8 and 1/2 by 11 inch white paper of heavy stock around which an approximately 1/8 inch wide black line had been drawn and reproduced to draw attention to the frame of the aesthetic space. All subjects drew with the same black medium point felt markers.

Procedure

Drawing sessions were conducted "one on one" with the observer and the subject. Each subject was asked to produce 4 drawings: 1) a warm up drawing: "draw anything," which served as a control for variation in the subject's drawings; 2) "draw happy;" "3) draw sad;" and 4) "draw angry." Directives (written on separate cards) were shuffled at the start of each session to insure that the tasks were randomized for each subject independently, thereby guarding against an order effect.

Scoring and Analyses

The dimensions of symbolic vehicle and referential connection were scored differently from the other aesthetic dimensions.

Scoring and Analysis of Vehicle and Referential Connection. In the scoring of vehicle (as representational or not) and referential connection (4 nominal categories as cited above), the investigator scored the drawings—with a reliability check with two independent judges on 15% of the data or 63 drawings. Agreement was 100% for the dimension of vehicle and 97% for connection. Chi square analysis using odds ratios was used to interpret these data.

Scoring and Analysis of Expression, Balance, and Appropriate Use of Line and Composition. The other dimensions were scored by 2 expert (art background) judges who were trained with drawings from pilot study. Scoring was done on a continuous scale from 1 (lowest score) to 4. Judges first scored overall expression: the extent to which overall, the drawing's aesthetic properties (including choice

of vehicle and use of line and composition) rendered the drawing expressive of (embodying) meaning or emotion. Next, they scored overall composition: the extent to which overall, the composition of the drawing was unified or balanced.

Then each judge was asked, "this drawing is meant to express a certain emotion, can you tell what that emotion is?" Responses were scored as "on" or "off" target in terms of their correspondence to intended meaning, or as "same valence" when the perceived emotion was of the same quality (e.g., depressed instead of sad) but not precisely the same as the meaning intended (see Davis, 1991, for results on target scores). The judges scored the dimensions of appropriate use of line and composition in terms of the emotion determined, responding to the question, "Given whatever meaning has been determined, is line used appropriately as agent to expression of meaning?" and as a separate question, "...is composition used appropriately as agent to expression of meaning?"

When the judges were one score away from each other (e.g., one judge gave a 3 and the other a 4), the mean score was taken. When the judges were two or more scores apart (e.g., one gave a 1 and the other a 4) the drawing was revisited in a final negotiation session. Scores were coded as "complete agreement" (no variance), "mean taken," or "negotiated."

Reliability as good agreement, i.e., the judges were in total agreement or one step away from each other, was found on 95% of the total scores (n=1680). Of that 95%, the judges were in complete agreement (no variance) on 878 or 52% of the total scores and one step away from each other (slight variance/mean taken) on 714 or 43% of the total scores. In the final negotiation session, the remaining 5% or 88 responses, of which 18 reflected strong or 3 step disagreement, were reconsidered and resolved.

Pearson Correlation Coefficients were computed overall and 4 separate one way ANOVAs (one for each outcome variable or dimension scored) tested the significance of differences in group means of total individual mean scores (per subject on all three drawings from 3–12). Post hoc comparisons ($p<.05$ Scheffe method) were used to reveal significant differences between groups.

Results

Results on Overall Expression and Composition and Appropriate Use of Line and Composition.

Highly significant group differences ($p=.0001$) were found in analyses of the scores for all 4 dimensions: for overall expression ($df=6$, $F=7.94$, $p=.0001$); for overall balance ($df=6$, $F=6.95$, $p=.0001$); for appropriate use of line ($df=6$, $F=9.49$, $p=.0001$) and of composition ($df=6$, $F=8.05$, $p=.0001$) as agents to expression. The adult artists scored highest overall and on each of the four dimensions with the youngest children and/or the adolescent artists producing the next highest scores.

Confirming the similarities between the production performance of the youngest children and artist adolescents and adults, post hoc analysis (<.05 Scheffe method) indicated that for each of the four dimensions, the adult artists' performance (Group 7) was significantly different from that of the non-artist adults and adolescents and the children in the literal stage (Groups 6, 4, 3 & 2); but not significantly different from that of the adolescent artists or the youngest children (Groups 5 & 1).

Overall. Overall means were calculated to produce broad views of drawing performance for the total population and for the individual groups. The overall mean (the mean of the sums of means for total scores) for the total population ($n=140$) across all 4 dimensions was 7.2. The overall mean for each group and the difference of individual group means (cited as plus [+] or minus [-] the

difference) from the total overall population mean (OTMS: n=7.2) are displayed in Table 3 below:

TABLE 3: **Overall Subjects Total Mean Score across All Dimensions By Group (n=20) and Indicating Difference from Overall Total Mean (OTMS n=140; m=7.2)**

Group	Total Mean Score	Difference from OTMS
One:	m=7.9	+0.7
Two:	m=6.2 (6.25)	**-1.0**
Three:	m=6.2 (6.22)	**-1.0**
Four	m=6.2	**-1.0**
Five:	m=7.9	+0.7
Six:	m=6.2 (6.25)	**-1.0**
Seven:	m=9.5	+2.3

Artist and Non-Artist Groupings. The similarities in overall scores of the children at the literal stage and non-artist adolescents and adults (all below the overall mean), as well as their differences from the youngest children, artist adolescents and adults (who all scored above the overall mean), seemed to warrant the consideration of subjects as "artist" (groups 1, 5, & 7: n = 60) and "non-artist" (groups 2, 3, 4, & 6: n=80) populations. The difference between these 2 composite groups' mean scores on all 4 dimensions was found to be highly significant. Table 4 below presents the different mean scores for these 2 groupings for each dimension and overall.

Table 4

Artist (Groups 1, 5, & 7) and **Non-artist** (Groups 2, 3, 4, & 6) Populations' Total Mean Scores on Each Dimension and Overall:

Dimension	**Artists' (n=60) Total Mean Score**	**Non-Artists' (n=80) Total Mean Score**
Overall Expression:	7.9	5.7
Overall Balance:	9.1	7.0
Appropriate Use of Line:	8.0	5.8
Appropriate Use of Composition:	8.0	5.7
Overall Mean:	8.3	6.1

Overall expression (df=1, F=19.71, p=.0001); Overall balance (df=1, F=13.45, p=.001); Use of line (df=1, F=19.4, p=.0001); and Use of composition (df=1, F=15.6, p=.0001).

The overall mean for all dimensions for the non-artist grouping is 6.1, more than three points lower than the adult artists' overall mean score of 9.5, and almost two points lower than the overall mean score of the youngest children and artist adolescents, m= 7.9.

Overall U. The results strongly confirm the prediction of u-shaped development for all four dimensions of artistic production. A view of that u emerges in which the 2 high points are occupied by the youngest children and the artist adolescents; with the adult artists performing ahead (n=+1.6) of either population. It seems reasonable to speculate that that "difference ahead" in the performance of the adult artists may represent the difference that training and experience afford.

Figure 2 below presents a graphic display of the configuration of these overall mean scores. Two trajectories are charted: 1) from the literal stage to adolescent and adult artist (marked by a continuous line); and 2) from the literal stage to adolescent and adult non-artist (marked by a broken line). These observations also suggest that, overall, the non-artist adults do not show advancement from the performance of children in the literal stage.

FIGURE 2

Results on Separate Dimensions. Table 5 below presents the mean scores for each group (n=20) for each dimension and in comparison with the mean score for the total population overall (n=140) on each dimension (as indicated):

FIGURE 2
Overall Mean Scores Across All Dimensions

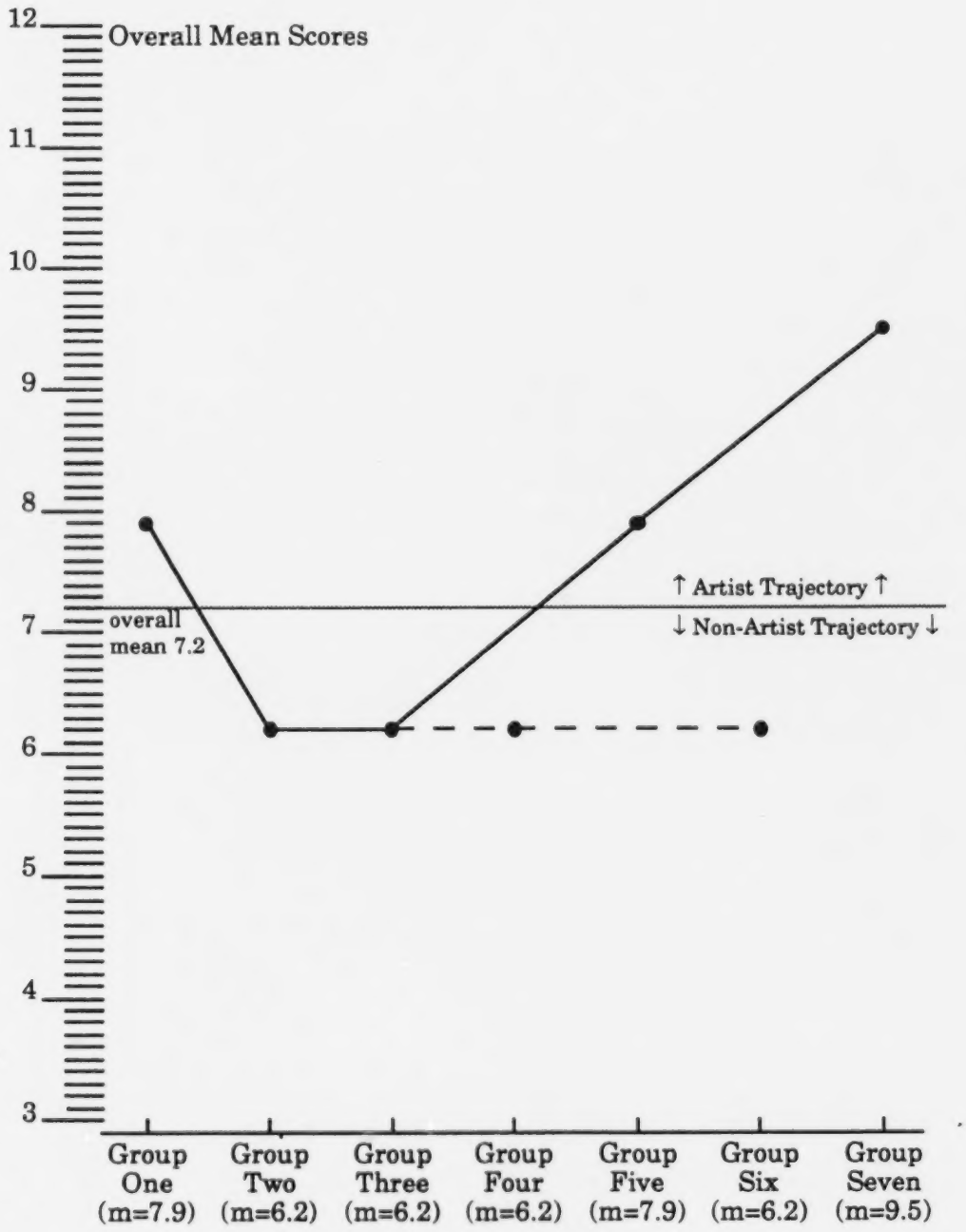


TABLE 5: **Group Means of Total Scores for Each Dimension in which A=group mean, & B=Difference between that score & Overall Total Mean Scores (OTMS)**

Dimension	Group													
	One		Two		Three		Four		Five		Six		Seven	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Overall Expression: (OTMS=7.4)	8.6	+1.2	6.5	-.9	6.8	-.6	6.5	-.9	8	+.6	6.1	-1.3	9.6	+2.2
Overall Balance: (OTMS=7.9)	8.3	+.4	7.2	-.7	7.1	-.8	6.9	-1	8.9	+ 1	6.7	-1.2	10.2	+2.4
Appropriate Use of Line: (OTMS=6.7)	7.5	+.8	5.7	-1	5.5	-1.2	5.7	-1	7.4	+.7	6.3	-.4	9.1	+.4
Appropriate Use of Composition: (OTMS=6.7)	7.3	+.6	5.6	-1.1	5.5	-1.2	5.8	-.9	7.4	+.7	5.9	-.8	9.2	+2.5

On the dimension of overall expression, the 5 year olds performed most like the adult artists: their overall mean (m=8.6) was one point below that of the professional artists' (m=9.6), and more than one point above the overall population mean (m=7.4). In appropriate use of line, the youngest children scored (m=7.5) about one and a half points below the adult artists (m=9.1) and about a half a point above the overall mean (m=6.7). In overall balance (m=8.3) and appropriate use of composition (m=7.3), the youngest children scored nearly 2 points below the adult artists (m=10.2 for balance; and m=9.2 for use of composition), and, again, about a half a point above the overall population (for balance, m=7.9; for appropriate use of composition, m=6.7).

In consideration of the *relative* state of the 5 year old's early knowledge, one might conclude that overall expression is, a relatively more well defined early understanding than overall balance. Given the closer similarities in means between the youngest children's scores in use of line as agent to expression and those of the professional artists, it would seem that that facility is more developed than the use of composition as agent to expression. Indeed, although the youngest children's early facilities in overall balance and appropriate use of composition surpass the overall population's, the youngest children perform least like the adult artists (perhaps demonstrating an association with experience

and training) on these 2 dimensions. Figure 3 graphically displays group mean scores for each of the four dimensions separately.

FIGURE 3

The graphic display reveals the post-literal stage course of development. For both overall expression and overall balance, the artist populations' (groups 5 & 7) scores increase after the literal stage, and the non-artist populations' (groups 4 & 6) scores decrease. However, on both appropriate use of line and appropriate use of composition, the non-artist adolescents and adults score higher than the children in the literal stage.

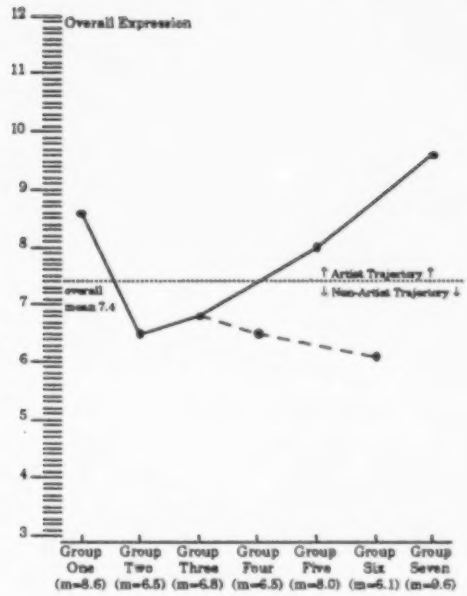
Considering the "whole" as the overall dimensions, and the parts of the "whole" as the differentiated skills, it appears that the "holistic" proficiencies in graphic symbolization evident in the youngest children (overall expression and balance) get lost in the trough of the u, while the more differentiated skills of appropriate use of line and composition seem more likely to survive.

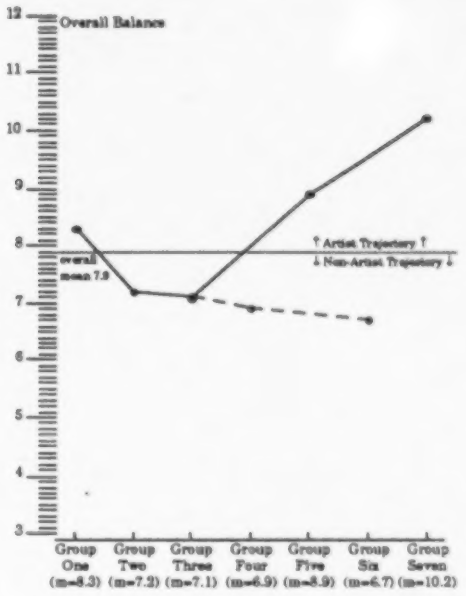
Results on Symbolic Vehicle.

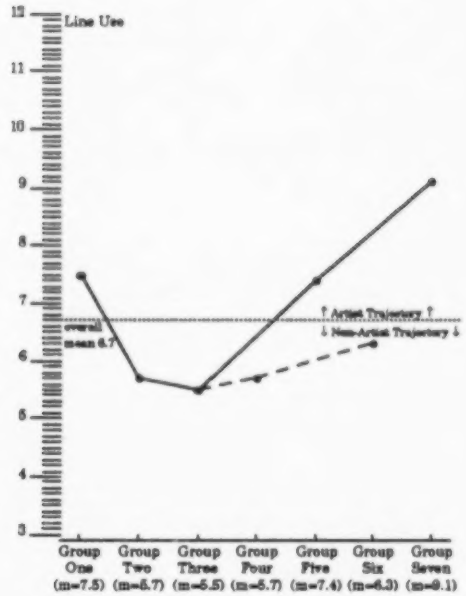
The hypothesis that the youngest children and the artists would employ both representational and non-representational vehicles was not confirmed. The choice of representational vs. non-representational symbolic vehicles was seen to be significantly associated with age (likelihood chisq: 92.9, df=12, p=.000). Non-representational vehicles appeared in the adolescent populations and increased 4 fold for the adult non-artist population. Although adult artists used approximately as many non-representational symbolic vehicles (n=27) as representational (n=33), only one of the 5 year olds used a decidedly non-representational vehicle.

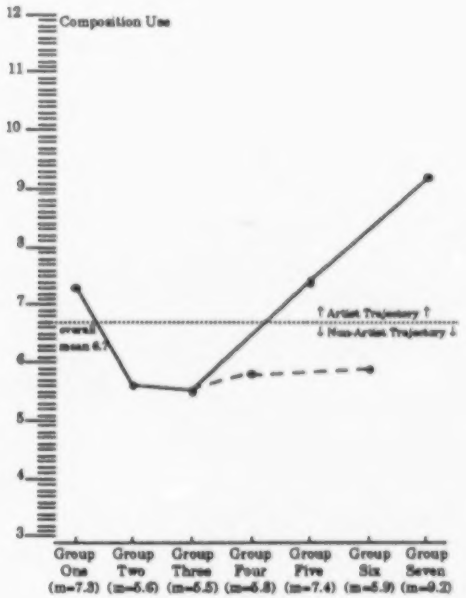
The expectation for non-representational vehicles in the youngest children's group may have resulted from the fact that 3 year olds had been included in pilot study and what many call "intentionless" scribbles abounded in

FIGURE 3
Mean Scores for Each Dimension









their productions. It is clear that the 5 year old who made the non-representational drawing of angry (drawing 4) did so intentionally not only because her "anything" drawing was of her recently deceased dog and her other drawings were not scored as non-representational, but also because she reported as she drew, scowling heavily as she pressed the marker to page: "When I think of angry, all I can think of is dark dark scribbles all over the paper. If I had time, you would hardly be able to see the white showing through." The adult artist who produced the similar drawing of angry (drawing 3) was not so direct in her process. She scowled like the 5 year old, bearing down as she drew, but she playfully mumbled to herself something about the policeman who had given her a ticket and other stimulating complaints.

As was hypothesized, children in the literal stage, both the 8 and 11 year olds, exclusively used representational symbolic vehicles. Of course, the fact that non-representational vehicles were used infrequently (only 40 out of 420) overall dilutes the importance of that observation.

In terms of recurring specific symbolic vehicles, it was in the representation of the emotion happy that the most frequent recurrence of symbolic vehicles appeared; in the representation of angry, the least recurrence appeared. A record of the distribution of recurring symbolic vehicles across the different age groupings revealed that the literal stage children and the non-artist adolescents and adults most frequently employed, and employed the same, stereotypical symbolic vehicles: balloons, birthday parties, and rainbows for happy; rain and funerals for sad; fire for angry.

Angry and non-representational vehicles. An extremely small significant positive association ($r=.10$, $p=.03$) was found between the representation of angry and the use of a non-representational vehicle. However, of the 40 non-representational vehicles used overall, twice as many non-representational

vehicles were used to represent angry (n=18) as to represent happy (n=9). Indeed across all groups, the only time a non-representational vehicle was used to express happy, it was done by a subject who had used non-representational vehicles to represent all three emotions.

The Referential Connection.

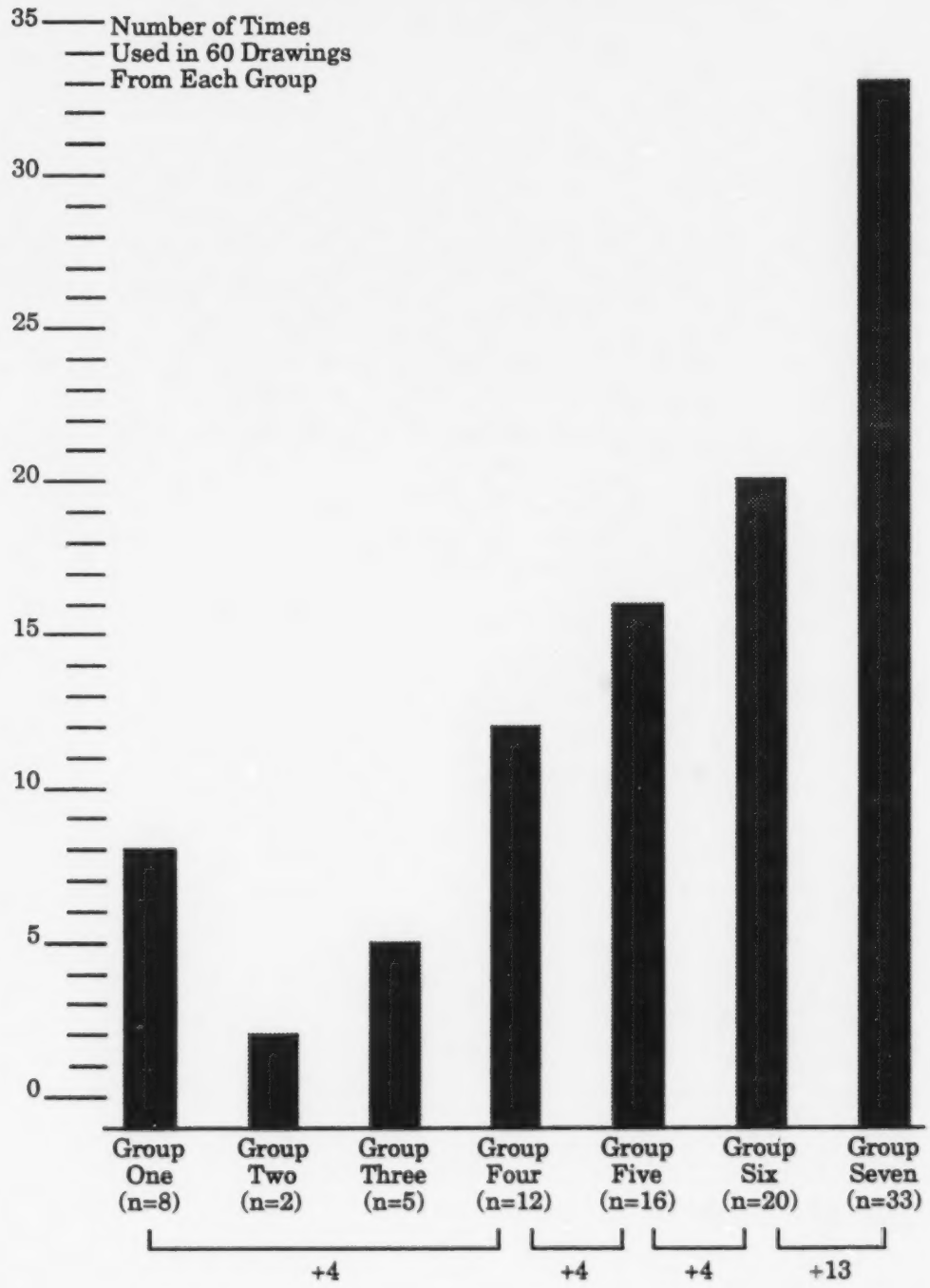
The results show a main effect of age on the use of referential connection (r=.43, p=.0001). The bar graph in figure 4 presents a visual display of the distribution of instances of the use of metaphoric connections (both objective and non-objective) across all 7 age groups.

FIGURE 4

As the chart indicates, use of the metaphoric referential connection (both metaphor 3 & 4) was apparent in all age groups, with a conspicuously low incidence of use by the children in the literal stage (groups 2 & 3). In fact, skipping over the decline in use in the literal stage, there seems to be a rather smooth and gradual increase in usage measured by 4 drawing increments (from 8 to 12 to 16 to 20) from the youngest children's group to the adult non-artist population. The large 13 step increment from non-artist adult usage to use by adult artists reflects the magnitude of the difference between artist and non-artist behavior especially when one takes into consideration that 27 of the 33 metaphoric connections employed by adult artists were also non/objective (metaphor 4).

These results point to confirmation of the hypothesized progression in the construction of metaphoric connections. The highly significant association (p=.0001) found between the metaphoric connection and high scores across all aesthetic dimensions reflects hierarchy as does its association with the adult artist

FIGURE 4
Use of Metaphoric Connection/s by Each Group



group. It is perhaps because of its reliance on appropriate use of line and/or composition, the metaphoric connection emerges as a symptom of artistry.

It may also be inferred from the "by four" drawing increments that development in the use of the metaphoric connection is submerged and not lost in the literal stage. Rather than emerging in group 4 at the same level as group 1 (as it might if it were lost and reinvented) it shows some increase not only from group 3 (an increment of 7), but also from the initial high of group 1 (the 4 step increment). The use of the metaphoric connection develops quite regularly after that period even if only to reach fruition in the work of the adult artist.

This developmental progression in the overall use (number of drawings in which used) of referential connections (from metonymy 1 to metaphor 4) can be seen in table 6 which displays the uses of all referential connections by all of the seven age groups.

TABLE 6: **Frequency of Use of All Referential Connections By the Various Age Groups For Each Group Overall (n=60 drawings)**

Connection	Metonymic: Physiological (1) N (%)	Narrative (2) N (%)	Metaphoric: Objective (3) N (%)	Non-objective (4) N (%)
Group Seven	13 (22%)	14 (23%)	6 (10%)	**27 (45%)**
Group Six	27 (45%)	13 (22%)	**12 (20%)**	**8 (13%)**
Group Five	21(35%)	**23 (38%)**	**15 (25%)**	1 (2%)
Group Four	19 (32%)	**29 (48%)**	**11(18%)**	1 (2%)
Group Three	**28 (47%)**	**27 (45%)**	5 (8%)	0
Group Two	**48 (80%)**	10 (17%)	2 (3%)	0
Group One	**40 (67%)**	11 (18%)	7 (12%)	1 (2%)

In this presentation, the most frequent usages for each group are noted in bold highlighted numbers. Regarding the metonymic/physiological connection, after usage as high as 28—48 of the 60 drawings made respectively by groups 1 through 3, in group 4, usage drops to 19. Although group 2 used metonymic/narrative connections in only 10 of their 60 drawings, group 4 used more than twice that number (n=27). While group 3 used only 5

metaphoric/objective connections; group 4 used 11; and from the one occurrence of metaphoric/non-objective in the 60 drawings of group 5, group 6 increased that usage to 8 or 13% of their drawings.

Discussion

The results strongly confirm the hypothesis of u-shaped development in graphic symbolization. In terms of the criteria of expression, balance, and control of line and composition, pre-school children, like professional artists, demonstrate a facility in graphic symbolization that surpasses the facility of older children and non-artist adults. In the achievement of overall expression, the youngest children performed most like the adult artists. Whereas children's skills in overall expression and balance submerge in the trough of the u and appear to decline thereafter, submerged skills in control of line and composition show signs of recovery.

The hypotheses for the use of symbolic vehicles and referential connections, on the other hand, were not confirmed. The youngest children did not perform like the artist adolescents and professional artists in their frequency of use of non-representational vehicles and metaphoric connections. However, the expectation for a progression in the use of referential strategies of expression has been supported.

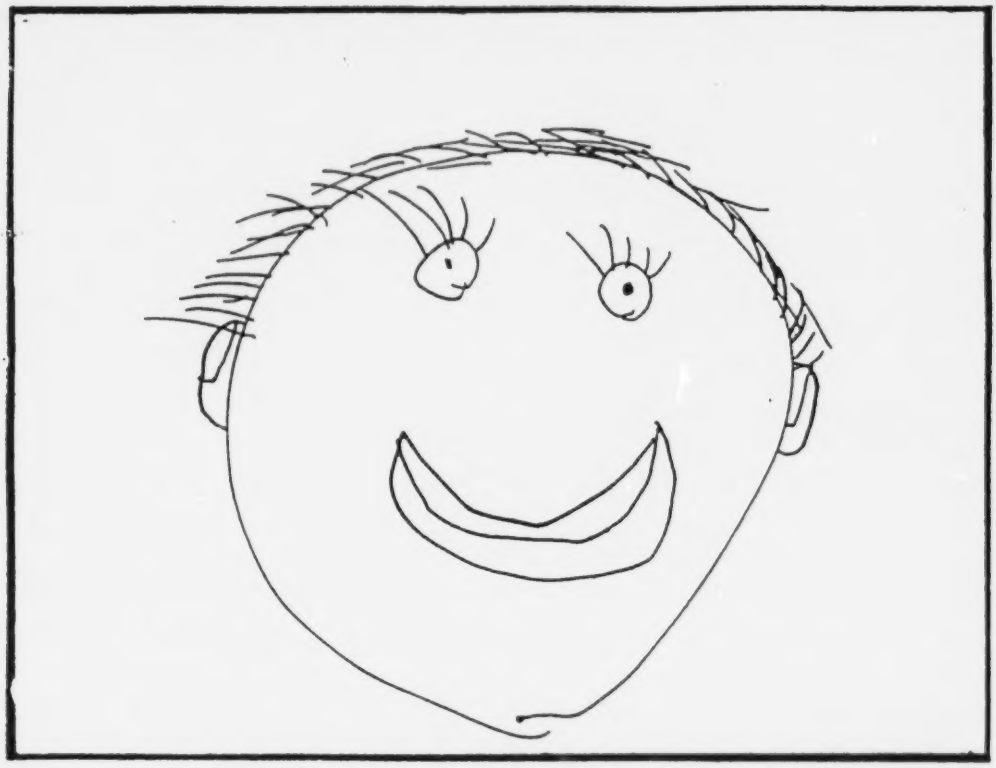
The gradual and regular appearance of new referential connections may be understood in terms of the relative distance of self from drawing reflected in the various connections chosen by the different age groups. Differentiation has been credited with the *loss* of vision of the whole, and a consequent decline in aesthetic production (D'Amico, 1966; Edwards, 1979; Golomb, 1992). The progression observed here suggests that one result of differentiation is the *acquisition* of the ability to construct a metaphoric referential connection.

In so far as the use of the metonymic/physiological connection may reflect the visible presence of self in the subject's drawing (e.g., Taylor said "My eyelashes always go up when I am happy" as he drew drawing 5), the metonymic/physiological connection which was so prevalent in the drawings of groups 1 (n=40 or 67%) and 2 (n=48 or 80%) may be considered as tangible sign of a less differentiated connection (lack of appreciation of boundaries—"I am my drawing") between child and drawing.

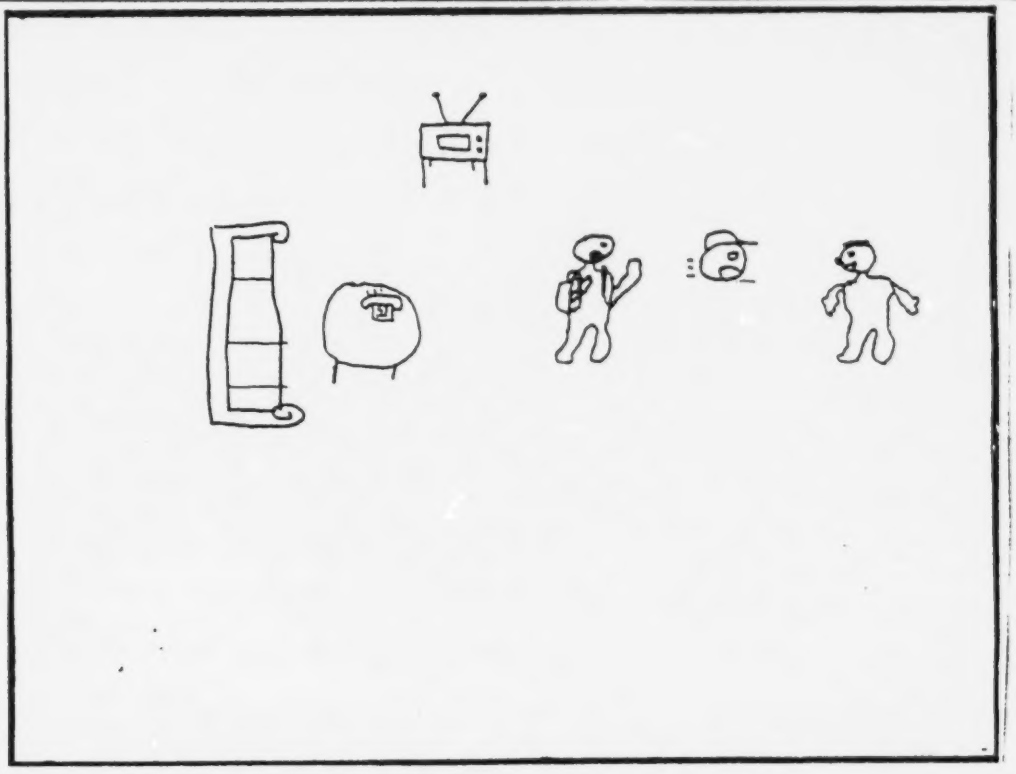
DRAWING 5: 5 year old Taylor's drawing of happy

This manifestation of self displaying emotion stands as a step towards differentiation when compared with the undifferentiated perspective of the three year old who scowls and angrily shoves her crayon-holding arm, only to call the resultant scribble angry. In that instance, the child is literally the vehicle for the emotion, the lines on the paper, markers or traces of *her own* embodiment of the emotion (Davis, 1986). In metonymy 1, the facial expression has been deliberately transferred to a representation of self. The five year old transfers real embodiment to a drawn face and, through that face, turns the child's own metonymic/physiological connection into metonymic/physiological symbolic reference.

In the metonymic/narrative connection more prevalent in groups three (n=27 or 48%), four (n=29 or 48%), and five (n=23 or 38%), that represented self is taken a step further and incorporated into a scene in which causal action is also represented. This may be regarded as a further step towards differentiation, reflecting the child's sense of a world of others whose different intentions have impact upon and/ or determine her own (see drawing 6). The self is visibly on stage (seen in the drawing) playing out the narrative in which the emotion is elicited. The elicitation is displayed.



DRAWING 5: 5 year old Taylor's drawing of happy



DRAWING 6: Non-artist adolescent David's drawing of angry

DRAWING 6: Non-artist adolescent David's drawing of angry

That the person displayed is the drawer is still evident. In drawing 6, 14 year old non-artist adolescent David uses the metonymic-narrative connection to describe a scene in which angry occurs. The drawing depicts a particular evening on which David slept at a friend's house and after a disagreement, David's friend threw a pillow at David. This use of a particular scene illustrates the persistent presence of self in the drawing.

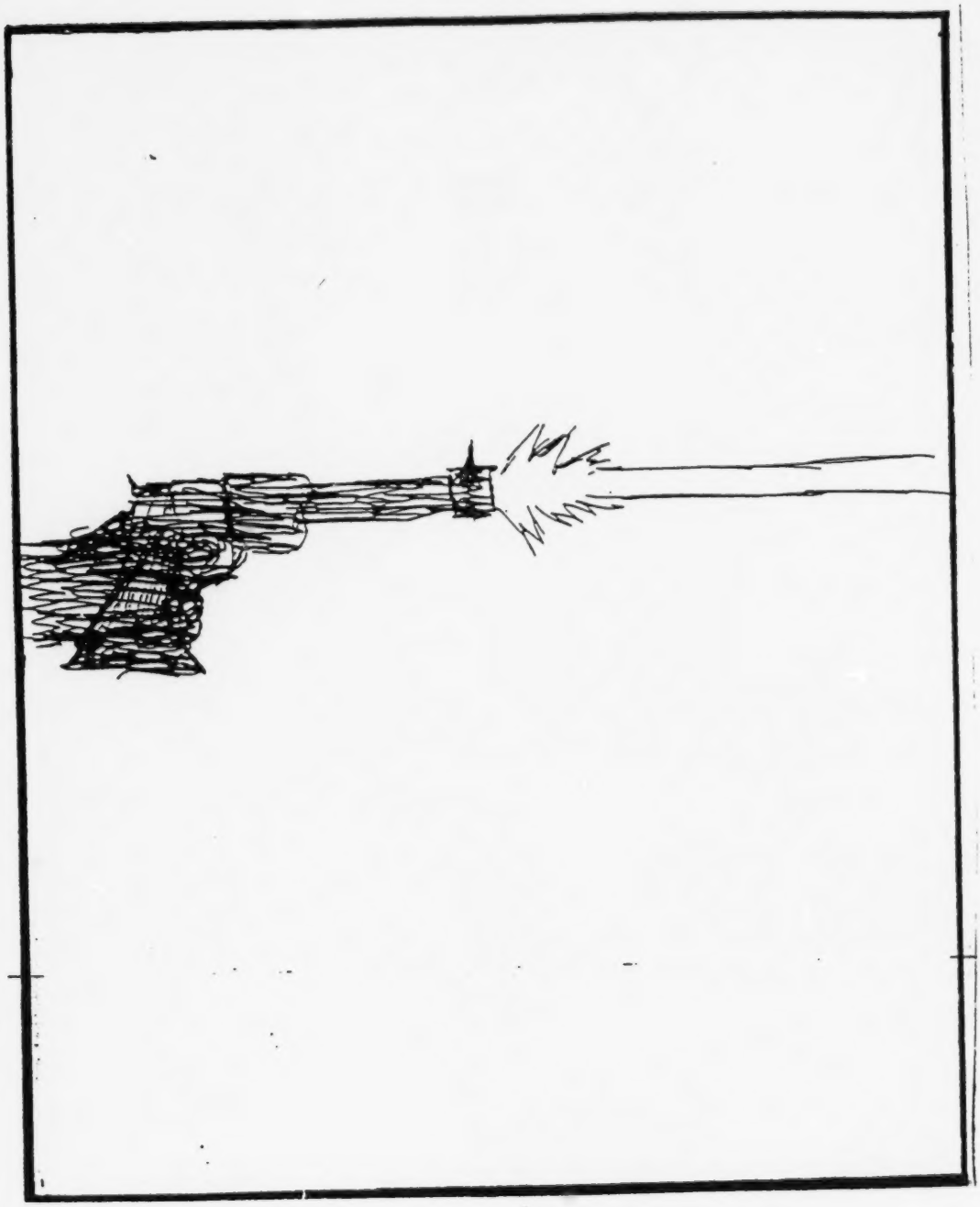
For Taylor (drawing 5), the drawing displays his own happy face; for David the drawing displays himself experiencing the emotion. For the 5 year old, physiological embodiment is sufficient; for the older child, the reason for the embodiment must also be displayed. For the 5 year old, the drawing *is* the child; for the older child, the drawing is *about* the child. For both, the experience of the emotion is externalized (with more complexity for the older child) and represented on paper. It is through such externalization that developing distance is articulated.

It is at age 14, that the literal self may be removed from the drawing, and the graphic symbol used to depict an object or token that *displays* (e.g., the firing gun in drawing 7 for angry) or *elicits* (e.g., the errant dog in drawing 8 which makes the drawer angry) the emotion.

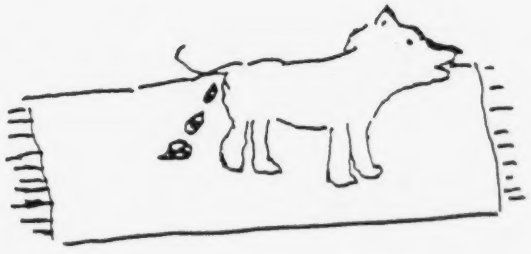
DRAWING 7: a 14 year old artist's drawing of angry

DRAWING 8: Non-artist adult's drawing of angry

In terms of self and distance, the self may be thought of as outside the drawing—not extended into it as with the 5 year old, but separated out at a distance from which it is now impacting or responding to the drawing—interacting with it. The drawer vests the object of the gun with the properties of the emotion; or reacts to the object or scene displayed. Neither interaction (the



DRAWING 7: a 14 year old artist's drawing of angry



DRAWING 8: Non-artist adult's drawing of angry

vesting or reacting) in the metaphoric/objective connection is displayed. The interaction may still be elicitation; but the elicitation is not displayed. Significantly, the self that reacts to these events or reconstructs them through the aspects that are displayed is outside of the drawing.

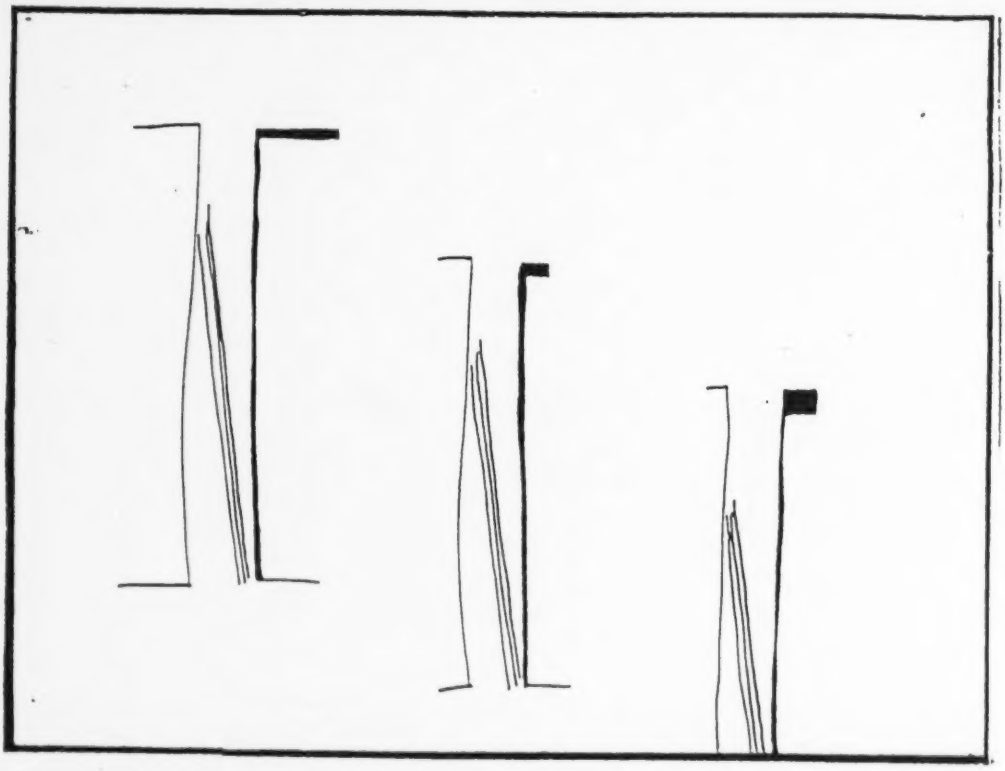
Self has distanced itself from the drawing. The occurrence of the metaphoric/non-objective connection in the adult age groups represents an understanding of the distance—of the separation between self and symbol. The graphic symbol is appreciated as more than a graphic representation of a self-referenced literal occurrence of the emotion (either in its entirety or some part thereof). It has gone the distance from extension of self to invention of symbol.

In drawing 7, the adolescent artists has achieved a drawing that is highly expressive of the meaning intended, anger. As a result of his organization of composition and his use of dark heavy lines, his drawing of the gun is a powerfully expressive visual metaphor. In contrast, the non-artist adult who drew the errant dog (drawing 8) used ambiguous lines with no regard for composition. Consequently, his drawing is not very expressive of the intended emotion of angry.

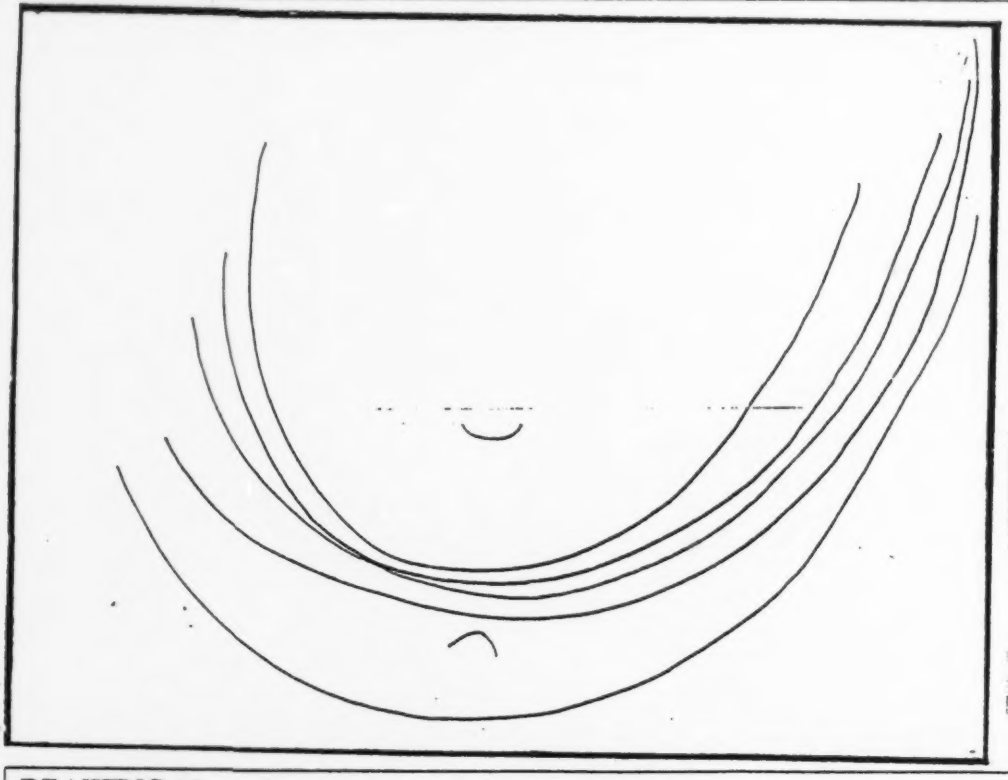
In drawing 9, another non-artist adult employed the non-objective metaphoric connection (metaphor 4) to convey the emotion of sadness. The resultant drawing, stiff and untelling, is not expressive of the intended meaning. In their choice of symbolic vehicles and referential connections, these non-artist

DRAWING 9: A non-artist adult's drawing of sad.

adults exhibit an understanding of the graphic symbol's potential to express meaning mètaphorically. However, wthout the requisite skills of aesthetic production, these non-artists are unable to exploit that potential.



DRAWING 9: Non-artist adult's drawing of sad



DRAWING 10: Adult Artist Seymour's drawing of happy.

Conclusion

In so far as representational vehicles refer to the objects of representation, they may be thought of as a kind of extension of those objects. In so far as non-representational vehicles refer only to themselves and the properties they embody, they may be thought of as new inventions in their own right. Drawings 3 and 10 are examples of adult artists' uses of the metaphoric non-objective connection.

DRAWING 10: Adult Artist Seymour's drawing of happy.

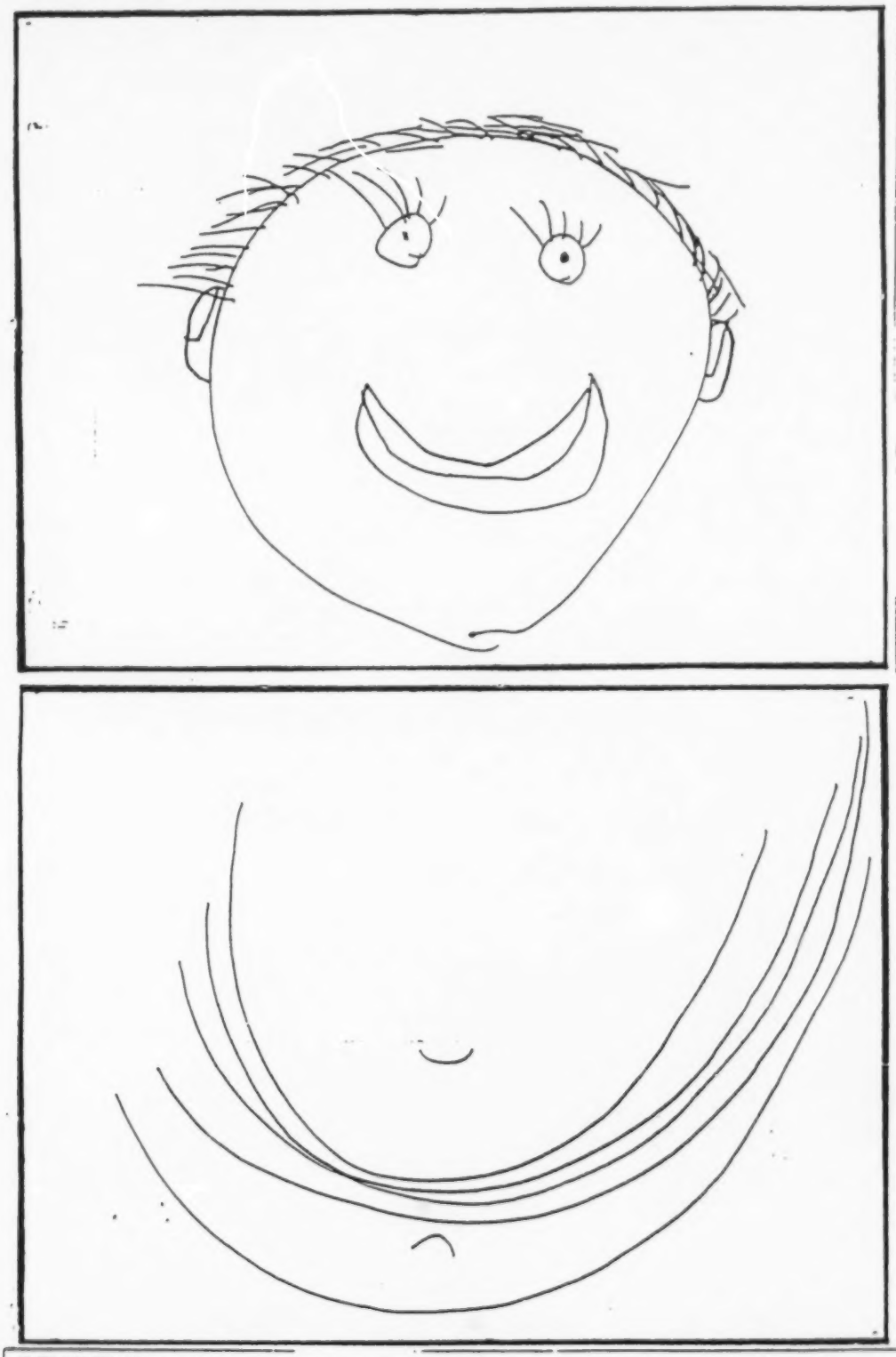
That the viewer cannot refer away from these drawings to a literal referent (self or object) requires that the viewer attend more fully to the properties contained in the drawing and in the construction of understanding, actively interact with these new inventions of line and form. Interpretation cannot be inferred from clues given by the drawing. Meaning is embodied by the drawing. The necessary reliance on line and composition for the communication of meaning fuses symbol and referent.

After all then, in the metaphoric/non-objective connection, we may see a similar lack of boundaries between symbol and referent as exists between young child and drawing. Comparing Taylor's drawing of happy, a happy Taylor (see composite drawing 11), the similarities abound. Because of a similar use of line

DRAWING 11: Comparison of 5 year old Taylor's drawing of happy and adult artist Seymour's drawing of happy.

and composition, from a distance at which the precise symbolic vehicle in each drawing could not be ascertained, the viewer would still recognize two happy drawings.

The child's understanding of the emotion is in terms of him or herself. The referent of the adult artist's drawing is the emotion itself, and by consciously employing the same lines and form that the boundariless young child exhibits in



DRAWING 11: Comparison of 5 year old Taylor's drawing of Happy and adult artist Seymour's drawing of happy.

her drawings, the artist breaks down the boundaries between symbol and referent and reclaims the lack of differentiation which is the gift and limitation of the youngest child. In reclaiming the gift of artistry, the adult artist redefines it.

The requisite understanding that allows that redefinition is acquired through development. For most of us, the requisite understanding to implement it is lost. The development of awareness of visual metaphor survives the literal stage or the trough of the u; the ability to demonstrate that knowledge does not. The demise of drawing from the flowering of creativity at age 5 emerges from this research as the poignant loss of skills needed to articulate aesthetic understanding which continues to develop—in spite of the individual's inability to give it form.

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